3. EDI MESSAGE STANDARDS

The success of EDI is based upon the existence of standards that govern the way data is transmitted from one trading partner to another. These standards explicitly define the way paper-based documents should be structured into electronic messages. In addition, they define the contents of each message and provide a finite list of codes that can be used to describe individual entries within the message. This section describes the history of EDI standards and provides an introduction to the most popular standards in use today.

3.1. THE NEED FOR EDI MESSAGE STANDARDS

Traditionally, business data has been exchanged between entities using paper documents and forms. However, the need for an alternative to these paper-based methods emerged as businesses sought to reduce the personnel costs associated with processing paper documents. Around the same time, businesses also started looking for ways to reduce the time needed to process information in order to respond more quickly to customers' needs. As a result, in the early 1960s, companies like K-Mart and Sears began to develop proprietary formats for electronic documents designed to replace the paper-based documents.

During the next decade, an increasing number of companies began sending and receiving electronic documents. However, as each of these companies developed its own proprietary standards, it became necessary for organizations to support multiple standards for transmitting the same types of information to different trading partners.

With the demand to conduct business electronically growing each year, it became increasingly apparent that companies could not continue to support multiple sets of proprietary standards. As a result, several industries developed standards for the most common electronic transactions used within that industry. For example, the automotive industry developed the Automotive Industry Action Group (AIAG) standards, and the transportation sector developed the Transportation Data Coordination Committee (TDCC) standards. However, by the late 1970s, businesses again found themselves supporting multiple sets of standards due to the necessity of transmitting documents across different industries.

This support of multiple standards led to the development and adoption of the following two public standards:

- **ANSI ASC X12:** ANSI ASC X12 is a set of EDI message standards developed and maintained by the American National Standards Institute, and is widely used within the U.S.

- **UN/EDIFACT:** UN/EDIFACT is a set EDI message standards developed and maintained by the United Nations, and is widely used internationally.

These standards are described in further detail in Section 3.3, ANSI ASC X12 Standards for EDI Messages and Section 3.4, UN/EDIFACT Standards for EDI Messages. It is important to note

that ANSI ASC X12 and EDIFACT standards has been adopted for use by Federal agencies implementing EDI, according to the Federal Information Processing Standards Publication (FIPS) 161.

Over a period of time other standards have evolved for EDI and electronic messages. Some of these standards are described below.

- **X.400:** The X.400 standard is an Open-System Interconnection standard for electronic mail and provides the means to send and receive interpersonal messages and formatted business transactions, using a basic transfer system for storing and forwarding messages. Later versions have added communications services for the open-system environment transmissions of EC transactions.

- **X.435:** The X.435 standard has been established to provide the EDI-specific message addressing for the X.400 "envelope" and thus allowing EDI messages to be routed over an X.400 backbone. The X.435 standard contains interchange control numbers and EDI document types that would improve security and audit trail capabilities. The X.435 also allows the trading partners involved in EDI transactions to provide notification of receipt and forwarding, and status reports to both the previous and the subsequent transport agents.

- **X.500:** The X.500 standard is also an Open-System Interconnection standard for directory services. The X.500 standard provides services to store and retrieve directory information with access control and replication of distributed data services. The X.500 directory services are available to X.400 users and provide electronic mail-addressing information, including EC trading partner and VAN address information.

3.2. COMPONENTS OF A STANDARD EDI MESSAGE

A complete ANSI ASC X12 EDI message consists of data elements grouped into segments. Segments are placed in transaction sets, that are then placed in functional groups. Functional groups are placed in interchanges. These terms are explained briefly below.

- **Data Elements:** Data elements are the smallest unit of information in an EDI message, and represent a single piece of information (e.g., unit price, item description).

- **Data Segments:** Data segments consist of strings of related data elements in a specific order. For example, an address data segment may be composed of city, state, and zip code data elements.

- **Transaction Sets:** A transaction set, consisting of data segments in a specific order, is the equivalent of a complete paper document (e.g., purchase order, invoice). Transaction sets are bounded by mandatory header and trailer segments.

- **Functional Groups:** A functional group is a group of similar transaction sets (e.g.,

multiple purchase orders or invoices). Functional groups are also bounded by special header and trailer segments.

- **Interchanges:** An interchange is a complete EDI message from one trading partner to another, that can include multiple functional groups and transaction sets. Interchanges are enveloped within interchange control segments which specify among other things, the sender and receiver of the interchange and their respective electronic addresses.

A graphical representation of the components of a standard EDI message is depicted in Exhibit 3-1.

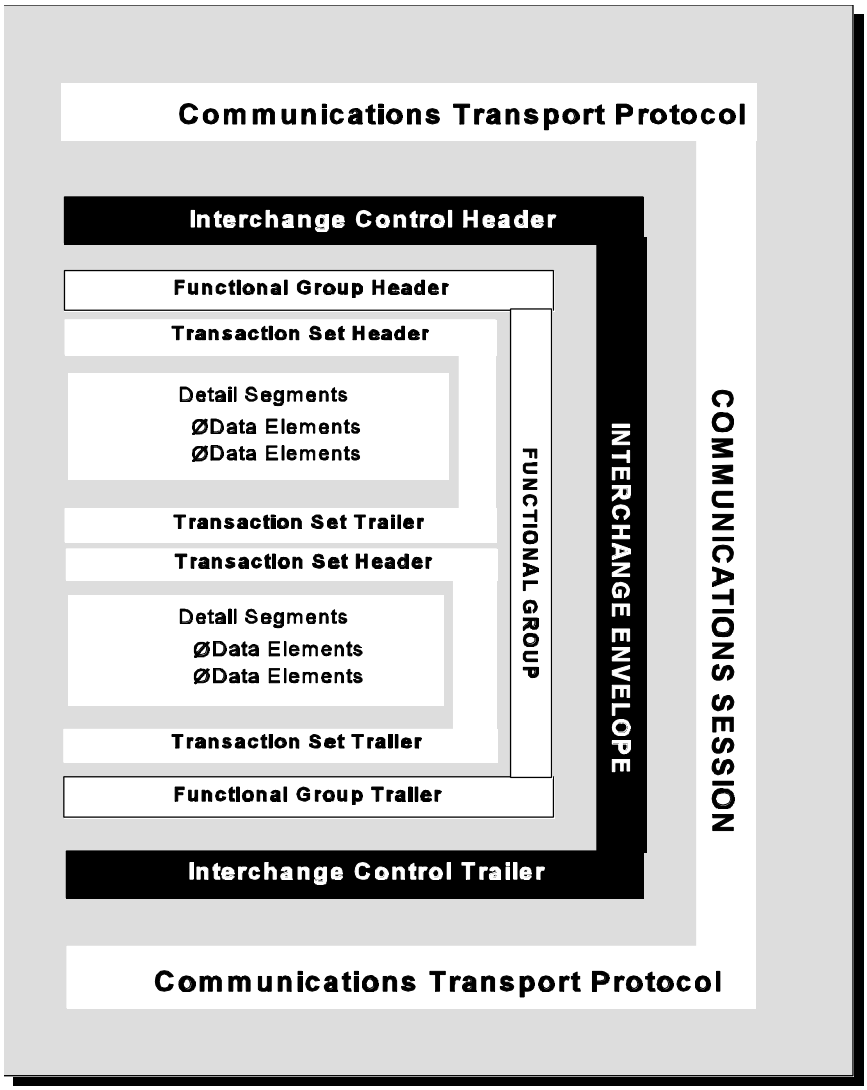

Exhibit 3-1: Components of an EDI Message

3.3. ANSI ASC X12 STANDARDS FOR EDI MESSAGES

The American National Standards Institute (ANSI) was founded in 1918, to serve as the coordinator for national standards in the United States. This voluntary standards system consists of a large number of standards developers who write and maintain several sets of national standards. Each year, thousands of individuals and companies, labor, consumer, and industrial organizations, and government agencies voluntarily contribute their knowledge, talent, and effort to standards development.

In 1979, ANSI chartered a new committee, known as the Accredited Standards Committee (ASC X12), to develop uniform standards for electronic interchange of business transactions, relating to functions such as order placement and processing, shipping and receiving, invoicing, and payment application, etc.

3.3.1 STANDARD ANSI ASC X12 DOCUMENTS AVAILABLE

Currently, there are over 200 documents available within the ANSI ASC X12 standards. The standards include common business documents like purchase orders and invoices, as well as special purpose documents such as student loan applications.

3.3.2 STRUCTURE AND ORGANIZATION OF ASC X12

The work of ASC X12 is conducted primarily by subcommittees and task groups who are responsible for the development of new standards and the maintenance of existing standards. Their recommendations are presented to the complete ASC X12 membership for ratification. The Data Interchange Standards Association (DISA) is the secretariat for ASC X12. Described below are three subcommittees that are of significance to the Federal government Electronic Commerce initiative.

- **X12F - Finance:** The primary responsibility of the X12F subcommittee is the development and maintenance of EDI standards and guidelines associated with remittance or banking functions, including invoices, payment transactions, bank reporting, and credit instruments.

- **X12G - Government:** The primary responsibility of the X12G subcommittee is to develop and maintain EDI standards and guidelines for use within the government, between governmental departments, and between the government and private sector. They also review and comment on standards and changes proposed by other subcommittees, that relate to transaction sets used by governmental agencies.

- **X12K - Purchasing:** The primary responsibility of the X12K subcommittee is the development and maintenance of EDI standards and guidelines associated with the procurement and acquisition of products and services and related pricing information.

Exhibit 3-2, ANSI AC X12 Organization, presents a pictorial view of the organization of X12.

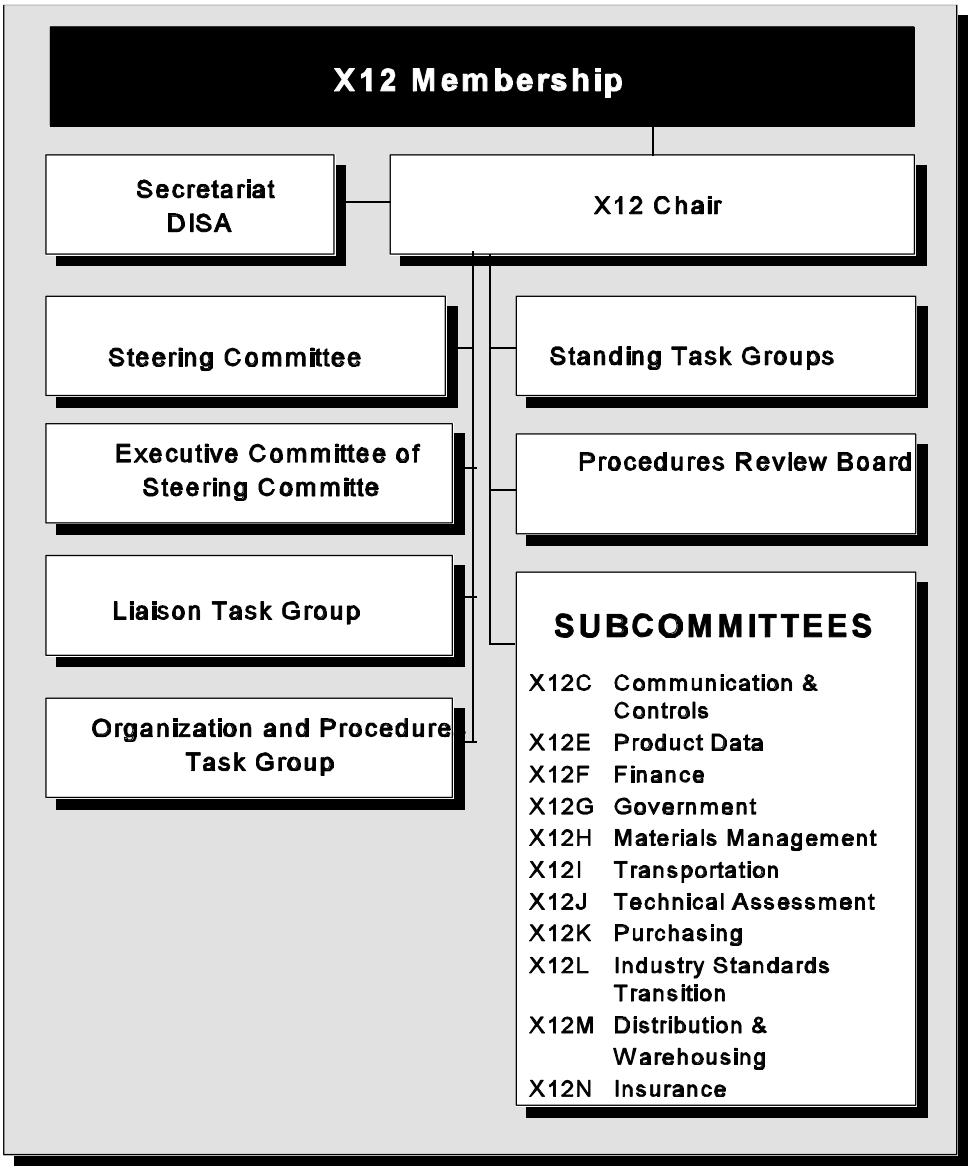

Exhibit 3-2: ANSI X12 Organization

3.3.3 ASC X12 STANDARDS DEVELOPMENT ACTIVITIES

The family of ASC X12 standards is constantly expanding as a result of the activities of the members of ASC X12 and standards users. ASC X12 members vote on technical issues by letter

ballots that are conducted by DISA. Administrative issues may be voted on by letter ballot or at general sessions during ASC X12 meetings.

Subcommittee votes are conducted according to procedures specified in each subcommittee's constitution, though typically, members who are active in a particular subcommittee are eligible to vote.

Exhibit 3-3 graphically illustrates the ASC X12 Standards Approval Process.

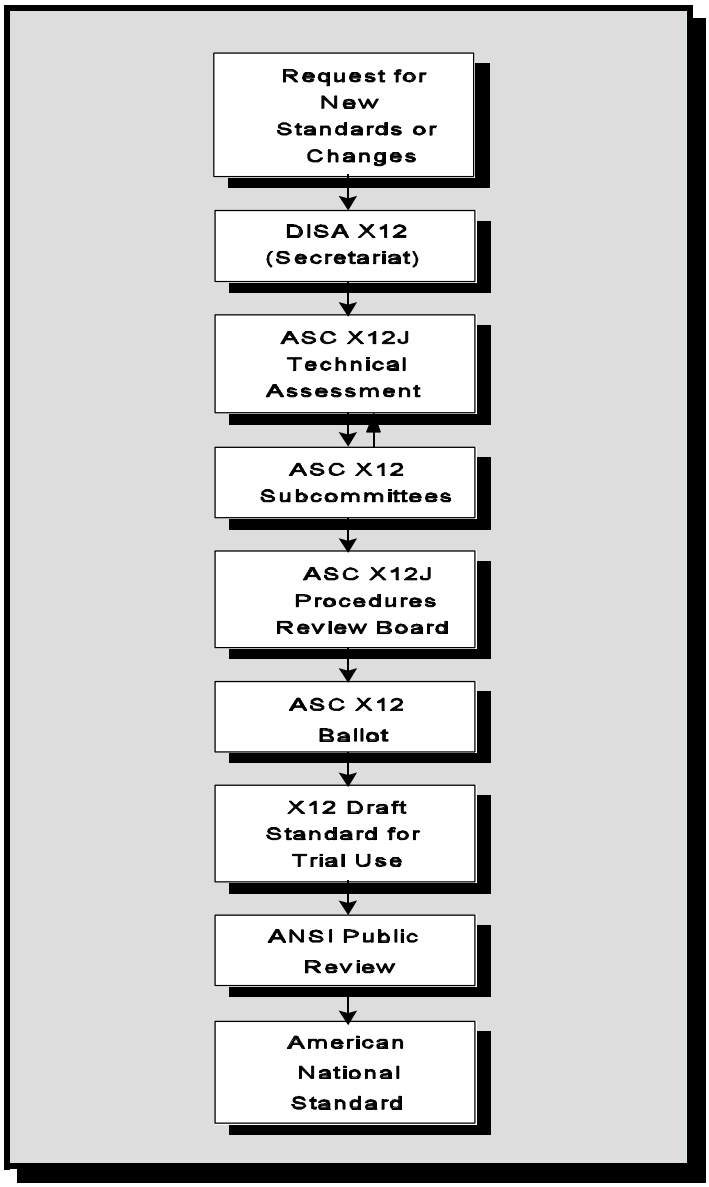

Exhibit 3-3: ANSI ASC X12 Standards Approval Process

3.3.4 ASC X12 PUBLICATION SCHEDULE

Each year, DISA publishes the entire set of ASC X12 standards in draft format, in what is known as a version/release. Each version/release includes revisions to previously published draft transaction sets and new draft transaction sets that were approved by ASC X12 during that year, and is uniquely numbered. The following is an example of the manner in which ASC X12 releases are numbered:

- Version 2, Release 0 ANSI 1986 (002000) superseded
- Version 2, Release 1 X12 08/87 (002001)
- Version 2, Release 2 X12 08/88 (002002)
- Version 2, Release 3 X12 04/89 (002003)

It should be noted that different releases are not necessarily upward or downward compatible, and it is important to determine the version and release of the standards that will be used, before embarking on an EDI implementation effort.

At three-year intervals, the latest release is reviewed by the ASC X12 subcommittees, who select appropriate draft standards and submit them to ANSI to begin the national public review process for their elevation to American National Standards. Standards that pass public review and are approved by ANSI, are published as American National Standards.

DISA also separately publishes other documents, such as ASC X12 technical reports and guidelines.

3.4. UN/EDIFACT STANDARDS FOR EDI MESSAGES

In 1986 the United Nations Economic Commission for Europe (UN/ECE) began developing the United Nations EDI for Administration (Government or Public Administration), Commerce and Transport (UN/EDIFACT) standards. These standards comprise of a set of internationally agreed-upon messages, directories, and guidelines for the electronic interchange of structured data that relates, in particular, to the trade of goods and services.

3.4.1 STANDARD DEVELOPMENT AND APPROVAL PROCESSES

The UN/ECE is responsible for all activities relating to the development and approval of EDIFACT standards. The UN/ECE includes countries of Eastern and Western Europe, several Asian republics, as well as the United States and Canada. Other members of the UN are entitled to participate in this process under Article 11 of the UN Charter. Within the UN/ECE's Committee on the Development of Trade, trade facilitation activities are undertaken by the Working Party on Facilitation of International Trade Procedures (WP.4), and within WP.4, the

GE.1 group (UN/ECE WP.4 Experts on Data Elements and Automatic Data Interchange) is responsible for the development of the global UN/EDIFACT standards.

Standard setting activities are executed by a group of rapporteurs who are nominated by country governments and appointed by WP.4. These rapporteurs are required to set up the appropriate machinery and facilities in their regions, including the appointment of a local Rapporteur's Team secretariat.

The Pan American EDIFACT Board (PAEB), one of six regional EDIFACT Boards in the world, is the official coordinating body of UN/EDIFACT activity in the Pan American Region. The Delegate Liaison Task Group (DLTG) coordinates Pan American UN/EDIFACT standards developments, proposals, and comments. Members are official representatives of national EDI standard setting bodies within Pan America and are authorized to act as official spokespersons for the organizations they represent. The DLTG has 13 message Design Groups dedicated to standards development and maintenance in the following areas:

- JMD Name
- JM1 Material Management
- JM2 Purchasing
- JM3 Product & Quality Data
- JM4 Transport
- JM5 Customs
- JM6 Finance
- JM7 Construction
- JM8 Statistics
- JM9 Insurance
- JM10 Travel,, Tourism,, Leisure
- JM11 Health Care
- JM12 Social Administration/Employment
- JM13 Network Administration

3.5. IMPLEMENTATION CONVENTIONS

While the ANSI and EDIFACT standards establish the basic structure of EDI messages, they do not specify the exact contents of a message between two trading partners. For example, in a purchase order, the standards allow for a product to be identified through the use of a product identification code, but do not specify which code should be used. Such decisions are left to individual trading partners. Therefore, trading partners adapt standard transaction sets to their specific needs through the development of Implementation Conventions (ICs).

An IC is a subset of ASC X12 or EDIFACT standards that represents agreement among EDI trading partners on how transaction sets will be used in a specific business context. ICs also adapt the standards to the specific needs of an industry. For example, the ANSI ASC X12 810, Invoice, transaction set may be adapted for use as a Commercial Invoice, a Progress Payment Invoice, or a

Public Voucher. The segments and data used in each of these contexts may be different.

3.5.1 FEDERAL IMPLEMENTATION CONVENTIONS

The Office of Federal Procurement Policy (OFFP) has set up a committee, known as the Federal EDI Standards Management Coordinating Committee (FESMCC), with representatives from a number of agencies. FESMCC is charged with developing implementation conventions and delineating the government interpretation and usage of standards in all functional areas. FESMCC is also responsible for representing government interests at ANSI ASC X12 meetings.

To carry out its role, FESMCC chartered functional workgroups to provide a focal point for the development and maintenance of and standards. Currently, there are three functional workgroups:

- **Financial Functional Workgroup (FFWG):** The Financial Functional Workgroup is an interagency committee that coordinates the development and maintenance of Federal ICs for transaction sets relating to financial activities, such as the 820, Payment Order and the 810, Invoice.

- **Procurement Functional Workgroup (PFWG):** The Procurement Functional Workgroup is an interagency committee that coordinates the development and maintenance of Federal ICs for transaction sets relating to procurement activities, such as the 850 Purchase Order.

- **Materials Management Workgroup (MMWG):** The Material Management Workgroup is an interagency committee that coordinates the development and maintenance of Federal ICs for transaction sets relating to supply, logistics and other administrative functions, such as the 870, Order Status Report.

To date, these three workgroups have developed Federal ICs for 14 transaction sets. A list of these sets is presented in Appendix B, Federal Implementation Conventions.